



## **Module Specification**

### **Advanced Structural Analysis**

Version: 2023-24, v6.0, 11 May 2023

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## Part 1: Information

**Module title:** Advanced Structural Analysis

**Module code:** UBGMM3-15-3

**Level:** Level 6

**For implementation from:** 2023-24

**UWE credit rating:** 15

**ECTS credit rating:** 7.5

**Faculty:** Faculty of Environment & Technology

**Department:** FET Dept of Geography & Environmental Mgmt

**Partner institutions:** None

**Field:** Geography and Environmental Management

**Module type:** Module

**Pre-requisites:** Applications of Mathematics in Civil and Environmental Engineering 2023-24, Structural Analysis 2023-24

**Excluded combinations:** None

**Co-requisites:** None

**Continuing professional development:** No

**Professional, statutory or regulatory body requirements:** None

## Part 2: Description

**Overview:** Pre-requisites: 60 credits at Level 2 To include: UFMFF7-15-2  
Applications of Mathematics for Civil and Environmental Engineering

**Features:** Not applicable

**Educational aims:** In this module students will develop the necessary knowledge, understanding and skills to analyse and solve problems relating to multi-variable

structural systems of both statically determinate and indeterminate structure types, including plates.

In addition the educational experience may explore, develop, and practise but not formally discretely assess the following:

Appreciation of the importance of validation and verification in interpretation of computer output.

Appreciation of the uncertainties inherent in selection of material properties, loadings and boundary conditions.

**Outline syllabus:** The syllabus includes:

Matrix methods in structural analysis: matrix algebra, matrix displacement method.

Stiffness method of structural analysis of pin-jointed structures and frames: nodes, elements, stiffness matrix, loads and restraints.

Introduction to finite elements analysis: nodes, elements, meshes, stiffness matrix, boundary conditions and loads.

Practical finite elements techniques: element types, mesh generation, pre-processing, post-processing.

Influence line analysis.

Modelling dynamic systems: single degree of freedom systems, multi degree of freedom systems, interpreting dynamic response.

### **Part 3: Teaching and learning methods**

**Teaching and learning methods:** This module will be delivered through lecture sessions aimed at establishing the discipline context, key definitions/concepts, and also at establishing a framework for learning. The lectures will be supported by e-learning using computer-based learning exercises. Through these mechanisms learners will also build upon the fundamental concepts covered in the lectures and start applying new understanding through the tasks and activities provided. Regular formative feedback is built into the weekly contact sessions.

**Contact Hours:**

On average students will receive 4.5 hours of contact time per week. This will be in a range of formats, including lectures, laboratory practicals, field work, tutorial or computer-based sessions, formative feedback sessions and support via e-mail.

The amount of time spent on activities in this module is:

**Activity:**

Contact time (lectures/feedback/practical sessions): 36 hours

Assimilation and development of knowledge: 84 hours

Coursework preparation: 30 hours

Total study time: 150 hours

**Module Learning outcomes:** On successful completion of this module students will achieve the following learning outcomes.

**MO1** Use matrix methods to carry out elastic structural analysis

**MO2** Use the stiffness method to carry out elastic structural analysis of trusses and frames

**MO3** Use the finite element method to model frames and plates to investigate their response to different load conditions

**MO4** Use of single and multi-degree of freedom models to assess the dynamic response of structures

**Hours to be allocated:** 150

**Contact hours:**

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

**Reading list:** The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://readinglists.uwe.ac.uk) via the following link

<https://uwe.rl.talis.com/modules/ubgmm3-15-3.html>

## Part 4: Assessment

**Assessment strategy:** Online Examination (4 hours).

Learning outcomes 1,2 and 4. Demonstration of learning outcomes 1, 2 and 4 is via solving unseen questions in a written examination. This allows the fundamental processes associated with these learning outcomes to be assessed with the assurance the work is individual. (2 hours)

Report (1000 words). Learning outcome 3. To allow the students to demonstrate learning outcome 3 a coursework task, requiring application of a finite element modelling to an engineering problem is used. The input parameters of the problem can be adjusted allowing for a unique problem for each student. The submission is a concise technical report.

Students work on the above tasks throughout the module and receive regular formative feedback in tutorial sessions.

Resit is the same as the first sit

### Assessment tasks:

#### Report (First Sit)

Description: Report (1,000 words)

Weighting: 50 %

Final assessment: No

Group work: No

Learning outcomes tested: MO3

#### Examination (Online) (First Sit)

Description: Online Exam (4 hours)

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

**Report (Resit)**

Description: Report (1000 words)

Weighting: 50 %

Final assessment: No

Group work: No

Learning outcomes tested: MO3

**Examination (Online) (Resit)**

Description: Online Exam (4 hours)

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

**Part 5: Contributes towards**

This module contributes towards the following programmes of study:

Civil Engineering [Sep][FT][Frenchay][4yrs] MEng 2021-22

Civil Engineering [Jan][FT][Northshore][4yrs] - Not Running MEng 2021-22

Civil Engineering [Jan][FT][Northshore][3yrs] - Not Running BEng (Hons) 2021-22

Civil and Environmental Engineering [Sep][FT][Frenchay][3yrs] - Not Running BEng (Hons) 2021-22

Civil Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2021-22

Civil and Environmental Engineering [Sep][SW][Frenchay][5yrs] - Not Running MEng 2020-21

Civil and Environmental Engineering [Sep][SW][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Civil and Environmental Engineering {Apprenticeship-UWE}

[Sep][FT][Frenchay][5yrs] - Not Running BEng (Hons) 2020-21

Civil and Environmental Engineering {Foundation} [Sep][FT][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Civil Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2020-21

Civil Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2020-21

Civil and Environmental Engineering [Sep][PT][Frenchay][5yrs] - Not Running BEng (Hons) 2020-21

Civil Engineering [Sep][PT][Frenchay][5yrs] BEng (Hons) 2020-21

Civil Engineering {Apprenticeship-UWE} [Sep][FT][Frenchay][5yrs] BEng (Hons) 2020-21

Civil Engineering [Sep][SW][Frenchay][5yrs] MEng 2020-21

Civil and Environmental Engineering [Sep][PT][Frenchay][7yrs] - Not Running MEng 2020-21

Civil Engineering [Sep][PT][Frenchay][7yrs] MEng 2020-21

Civil and Environmental Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20